**ATTORNEY DOCKET: PD-02W189**
***PATENT***

**IN THE SPECIFICATION:**

Please replace the paragraph beginning at page 11, line 3 with the following rewritten paragraph:

An illustrative embodiment of the present invention uses a porro prism or Benson prism in conjunction with a slab laser medium within a laser resonator to homogenize the beam spatial profile in the near and far field. This illustrative embodiment also takes advantage of the low Fresnel number in the narrow dimension of the slab to improve the beam quality in both transverse beam directions. Generally, the transverse principal dimensions and axes of the slab and those of the beam are assumed to align and correspond, and are used interchangeably in this disclosure. A drawing of such an embodiment is depicted in Figure 4, which is taken from both a top view and a side view orientation of the beam path. A high aspect ratio slab of ytterbium ion doped yttrium-aluminum-garnet ("Yb:YAG") 34 is disposed along the beam longitudinal axis 52 within the resonator. The slab ~~32~~ 34, which is side pumped or end pumped with indium gallium arsenide (InGaAs) laser diodes (not shown), serves as the laser gain medium. An intra-cavity anamorphic telescope, consisting of optical elements 38, 40, and 42, expands the beam 52 along the narrow dimension and compresses the beam along the wide dimension of the slab. The design and implementation of an anamorphic telescope is known to those skilled in the art, and readily implementable once the parameters are defined. The expansion and compression of the beam 52 are applied such that the beam is symmetrical about both transverse dimensions as it enters the first porro prism 50. The telescope 38, 40, 42 is located at some distance from the limiting aperture of the slab in order to minimize the Fresnel number of the resonator. Those skilled in the art will appreciate that a resonator structure with an aperture stop placed along its path results in the equivalent of a long beam path with plural powered optics and plural aperture stops periodically placed along its length. Such a structure causes the beam to converge on a stable mode, the so-called Eigen mode, as it builds over time. Spacing the aperture stop, which is the slab in the illustrative embodiment, away from the telescope allows the

Eigen mode to be reached more quickly. A mechanical aperture stop can also be used, and may be preferred in certain applications. A thermal lensing compensator lens 36 may be located along the beam path ~~53~~ <u>52</u> to compensate for thermal lensing that may occur within the gain medium 32.

Please replace the paragraph beginning at page 12, line 1 with the following rewritten paragraph:

The resonator cavity length is defined by the first porro prism 50 and a second porro prism 30. The first porro prism 50 is rotated 45° degrees about the optical line-of-sight 52 with respect to the slab ~~32~~ <u>34</u> axes. This orientation causes a 90° rotation of the beam spatial profile on successive resonator passes. In this embodiment, a conventional polarization beam splitter 44 is used as the resonator out-coupler. Other out-coupling techniques may be used without departing from the spirit and scope of this invention. Out-coupling is enabled by activating an electro-optic switch 32. When activated, the switch rotates the beam polarization thereby allowing none, or a potion of, or all of the beam 46 to be out-coupled from the resonator. Note that a half-wave plate 48 is used to re-orient the beam polarization to be in alignment with the principal axes of the first porro prism 50.

Please replace the paragraph beginning at page 13, line 13 with the following rewritten paragraph:

Reference is directed to Figure 5, which is a perspective drawing of a short-pulse mode-locked and cavity dumped laser resonator according to an illustrative embodiment of the present invention. Figure 5 illustrates a short-pulse laser radar ("ladar") application of the present invention. A dual-mode electro-optic ("EO") switch 64 is used with a relatively long 4-fold resonator to achieve cavity dumping of a mode-locked waveform. The dual mode EO switch 64 is driven by a voltage waveform that provides high holdoff

during an initial period, which allows high gain to build in the laser medium without extraction. This period is followed by a sinewave-modulated high transmission period, which allows a single mode-locked pulse to build within the cavity. This is then followed by 100% output coupling, which allows the pulse to be extracted via the polarization out-coupler 60. A resonant reflector ~~92~~ 90 is used to limit the number of longitudinal modes propagating in the resonator, which determines the mode-locked pulse duration. Those skilled in the art will recognize that the pulse width roughly equals the cavity round-trip time divided by the number of longitudinal modes. The theory of operation of a mode-locked laser resonator is also known to those skilled in the art. The foregoing approach has several advantages over conventional Q-switching. First, very short pulse widths can be achieved with a relatively low-gain medium such as Yb:YAG. Second, the intra-cavity optical flux is only about 1.4 times that of the output flux, which results in lower optical damage and higher reliability of the resonator. Also, the short pulse duration is not dependent on a short round-trip propagation time within the cavity, and therefore a long cavity can be used to provide very good beam quality with a low Fresnel number. A long cavity is also advantageous in providing time to cavity dump the circulating mode-locked pulse.

Please replace the paragraph beginning at page 14, line 4 with the following rewritten paragraph:

In Figure 5, the other components of the system are now described. The resonant cavity is terminated with a resonant reflector ~~92~~ 90 and a wave plate 92 at a first end, and a porro prism 54 at a second end. The roof line of the porro prism 54 is rotated 45° with respect to the principal axes of the laser gain medium slab 72. A half-wave plate 56 is positioned along the beam path ~~92~~ 44 near the porro prism 54 to correct beam polarization with respect to the out-coupling and Q-switch functions. The out-coupler 58 is a polarization type device that outputs a pulse of laser energy 60 when the EO switch 64 is activated by a suitable electrical waveform. The relatively long optical path ~~92~~ 94 is

folded into a four-pass path by a wide folding prism 62 and a section of a corner cube retro-reflector 88. An anamorphic telescope including lens elements 80, 82, 84, and 86 reshapes the beam profile to a symmetrical profile. A pair of diode pumplight arrays 78 and 66 end pumps the gain medium slab 72 through a pair of coated reflectors 76 and 68 respectively. Lens elements 74 and ~~72~~ 70 couple the pumplight and laser beam in and out of the slab 72.

Thus, the present invention has been described herein with reference to a particular embodiment for a particular application. Those having ordinary skill in the art and access to the present teachings will recognize additional modifications, applications and embodiments within the scope thereof.

It is therefore intended by the appended claims to cover any and all such applications, modifications and embodiments within the scope of the present invention.